Scripta Scientifica Medica, vol.28, Suppl.1,pp.73-74

EXPERIMENTAL STUDIES OF THE INFLUENCE OF HIGH DOSES OF VITAMINS A AND E ON THE 5'NUCLEOTIDASE AND ADENYLPYROPHATASE ACTIVITY AND ON THE QUANTITY OF THE THIOL GROUPS IN THE HEART MUSCLE OF WHITE RATS

N. Ivanov

Department of Medical Chemistry and Biochemistry, Varna

It is known that 5'nucleotidase and adenylpyrophosphatase play an important role in the processes of atherosclerosis (4,6,8). Our aim was to study the influence of vits. A and E on those two enzymes and quantity of thiol groups in the heart muscle. 32 female rats of about 150 g b. w. were used in the following groups: I-control; II-treated with high doses of vit A; III-treated with high doses of vit E. Vit A and vit E were injected 3 times during 10 days to the summary doses of 100 000 IU per rat (vit A) and 45 mg per rat (vit E). All animals were fasted for 15 h and were killed at the same time of day. The enzyme activity in the heart muscle was determined by using a modification of Zemplenyi et al (8) to the methods of Ahmed and Reis (3) for 5'nucleotidase and of Banga and Novotny (4) for adenylpyrophosphatase. Thiol groups were determined by using our modification of polarographic method of amperometric titration (5). The results obtained are shown on table 1.

Table 1

	I - controls n = 9			II - vit A n = 12			III - vit E n = 11		
	$\bar{X}$	S	$S_{\bar{X}}$	$\bar{X}$	S	$S_{\bar{X}}$	$\bar{X}$	S	$S_{\bar{X}}$
5'nucleotidase *	0.253	0.060	0.020	0.331	0.046	0.013	0.344	0.062	0.019
Adenylpyrophosphatase *	0.876	0.119	0.040	1.103	0.091	0.026	1.568	0.221	0.067
Thyol Groups **	2.985	0.566	0.179	13.009	2.369	0.790	17.265	4.753	1.584

* Activities expressed as mgs phosphate per mg protein

** Mol . 10^{-7} per mg protein

Statistically significant increase in the 5'nucleotidase activity in

the heart muscle of female rats injected with high doses of vit A was found ($t=3,360$; $p<0,002$). Significant increase in the same activity was obtained under the influence of high doses of vit E as well ($t=3,296$; $p<0,01$). High doses of vit A led to statistically significant increase in the adenylpyrophosphatase activity in the heart muscle ($t=4,931$; $p<0,001$). Significant increase in the same activity was obtained under the influence of high doses of vit E as well ($t=8,411$; $p<0,001$). Our experiments revealed a considerable statistically significant increase of the thiol groups in the heart muscle after the injection of high doses of vit A ($t=27,571$; $p<0,001$). A significant increase of the thiol groups was obtained after the injection of vit E as well ($t=9,456$; $p<0,001$). An increase of pyrimidine nucleotides and of pyruvate in blood and tissues is caused by vit A deficiency (1). The increased activity of the 5'nucleotidase in the muscle under the influence of high doses of vit A corresponds to these data. The increased enzyme activity leads to rapid destruction and lowering of the concentration of all nucleotides. In another study of ours (2) increased 5'nucleotides activity in the aorta under influence of high doses of vit A was obtained. There is a correlation between vits A and E (1,7). Vit E enhances metabolism of the purines and nucleic acids. According to our results, high doses of vit E lead to a significant increase of the 5'nucleotidase activity. The increased metabolism of the purines and nucleic acids may be related to that. It is possible that the interaction between the two vitamins in the organism has a positive effect on enzyme activity. Other authors report that vits A and E play an active role in the processes of biological oxidation. Still there is not a sufficient explanation to that effect. It is possible that the data obtained about the increase of the adenylpyrophosphatase activity relate to those processes. The considerable increase in the quantity of thiol groups obtained under the influence of vits. A and E may be related to the increased enzyme activities studied.

REFERENCES: 1. Душейко А.А.Витамин А. Киев, Наукова думка, 1989,116. 2. Калицин Д., Н.,Иванов. В:Юбил. науч. сес. ВМИ-Варна, 1974, III, 1. 3. Ahmed Z.Y., L.Reis. Biochem. J., 69, 1958, 386-387. 4. Banga I., A.Nowotny. Acta Physiol. Acad. Sci. Hung., 2, 1951, 317-325. 5. Ivanov N. Scr. Sci. Med.16,1979,14. 6. Kirk J.E. Intermediary metabolism of human arterial tissue and changes with age and atherosclerosis. In: Atherosclerosis and its origin. New York, Acad. Press, 1963, 67. 7. Terroine T. Les interrelations vitaminiques. Paris, 1966. 8. Zemplenyi T., O.Mrhova, Z.Loyda. J. Atheroscler. Res., 3, 1963, 50-56.